CLAIMS

1.   A method of predicting the failure of a rock formation
surrounding a subterranean cavity, comprising the steps of

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- measuring a set of parameters relating to pressure
conditions and stresses in the rock formation surrounding
the subterranean cavity;

10   - using the set of parameters to determine a rock strength;

- determining a first characteristic length relating to the
size of the cavity;

15   - determining a second characteristic length relating to
the grain size of the rock formation surrounding the
cavity;

- using the first and second characteristic lengths to
20   determine a correction for the rock strength;

- correcting said rock strength; and

- using a failure criterion and the corrected rock strength
25   to predict a condition under which the rock formation is
  a   expected to fail, producing debris.

2.   The method according to claim 1 wherein the set parameters
includes sonic wave slowness.

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3.   The method according to claim 1 wherein the set parameters
includes the formation density.

4.   The method according to claim 1 wherein the set parameters
35   includes the wellbore and formation pressure.

5.   The method according to claim 1 wherein the failure criterion is a shear failure criterion (Mohr-Coulomb).

5   6.   The method according to claim 1 wherein the failure criterion includes a term corresponding to an uniaxial compressive strength (UCS).

7   The method according to claim 1 wherein the correction
10   includes forming the quotient of the first and the second characteristic length.

8.   The method according to claim 1 further including the step of determining a wellbore production pressure using the
15   failure criterion.

9.   The method of claim 1 wherein the set of parameters relating to pressure conditions and stresses in the rock formation surrounding the cavity are at least partly
20   measured while drilling.